5.2 Descriptive measures

Name: _____ Class: _____ Date: _____ **Total: 14 marks**

KEY WORDS mean • median • standard deviation

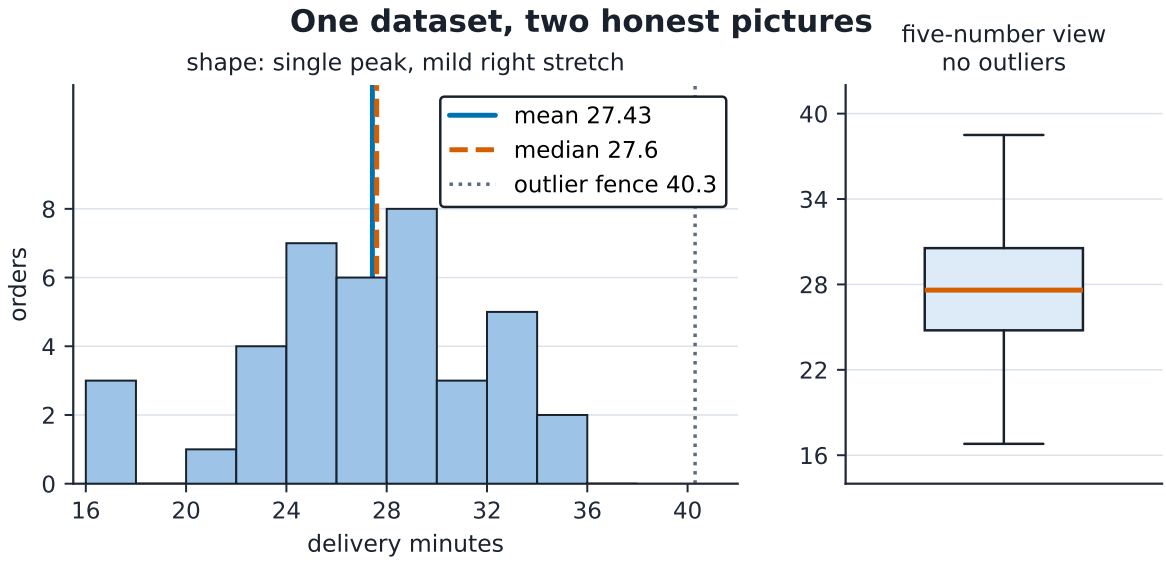
Objective

Compute and interpret centre and spread; detect shape; handle outliers responsibly; keep charts honest.

1 Key knowledge and worked examples

■ Four questions for any dataset

Centre (**mean** vs **median**), spread (**standard deviation** vs IQR), shape, outliers – reported together. The mean follows tails; the median resists them; the 1.5×IQR fence detects but never convicts.



One dataset, two honest pictures

■ Worked example. The course dataset

Mean 27.43, median 27.6, sd 4.91, quartiles 24.5/27.6/30.9, IQR 6.3, fences 15.0 and 40.3 – the 38.5 maximum stays inside. Mistype it as 168: mean jumps to 30.43, sd to 22.0, the median moves 0.05, and the fence catches it ✓.

exercises.lol exercises.com.cn

2 Practice

A second shop's 30 delivery times: sum 900.0; squared deviations from the mean 512.0; sorted, the 15th and 16th values are 28.4 and 28.8; quartiles 24.0 and 33.0; maximum 41.2.

2.1 Compute the mean, median, sd and IQR. [4]

2.2 Apply the 1.5×IQR rule: is 41.2 an outlier? Show the fences. [2]

2.3 The slowest delivery is traced to a road closure. What are the three defensible options, and which is NOT defensible? [3]

2.4 A slide shows these times on an axis starting at 24. In two lines, what is wrong and what are the two honest fixes? [2]

2.5 The shop's mean (30.0) exceeds its median (28.6). In two lines, what does that gap say about the shape, and which average should the advert quote – with what caveat? [3]

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Solutions

2.1

- Mean $= 900/30 = 30.0$.
- Median $= (28.4 + 28.8)/2 = 28.6$.
- sd $= \sqrt{512/29} = \sqrt{17.66} = 4.20$.
- IQR $= 33.0 - 24.0 = 9.0$.

2.2

- Fences: $24.0 - 13.5 = 10.5$ and $33.0 + 13.5 = 46.5$.
- $41.2 < 46.5 \rightarrow$ not an outlier by the rule (high, but inside).

2.3

- Defensible: report with the cause noted; report with and without it; keep it (it is real demand).
- Each option documented in the analysis.
- NOT defensible: silent deletion – the fence is a detector, not a verdict. (stated across the marks)

2.4

- Truncation multiplies visual differences with true numbers.
- Fixes: axis from zero, or a clearly marked broken axis.

2.5

- Mean > median signals right skew: a slow tail pulls the mean up.
- The advert should quote the median (the typical experience).
- Caveat: say which average is quoted – the mean is honest too, for workload planning, not for promises.